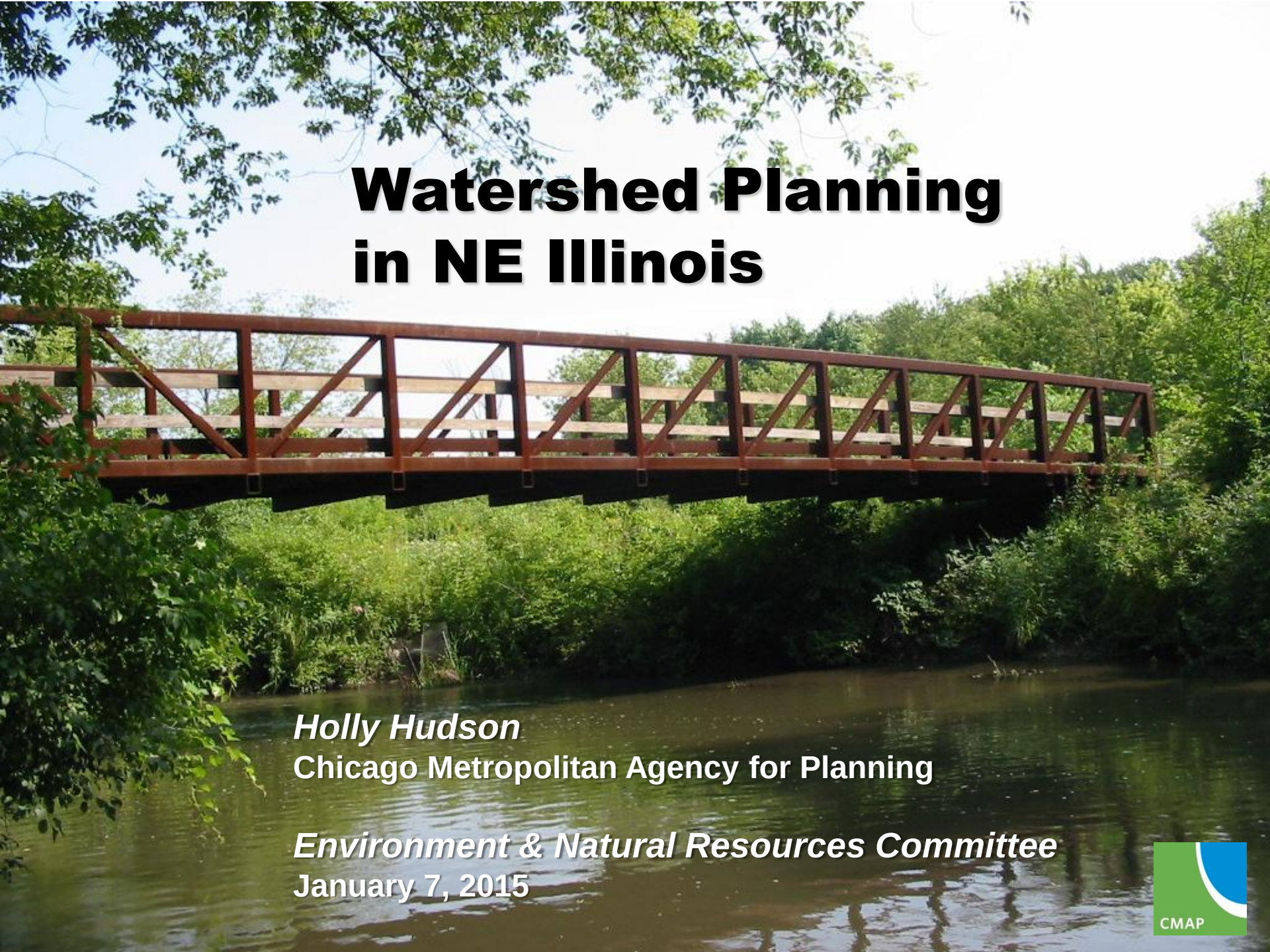
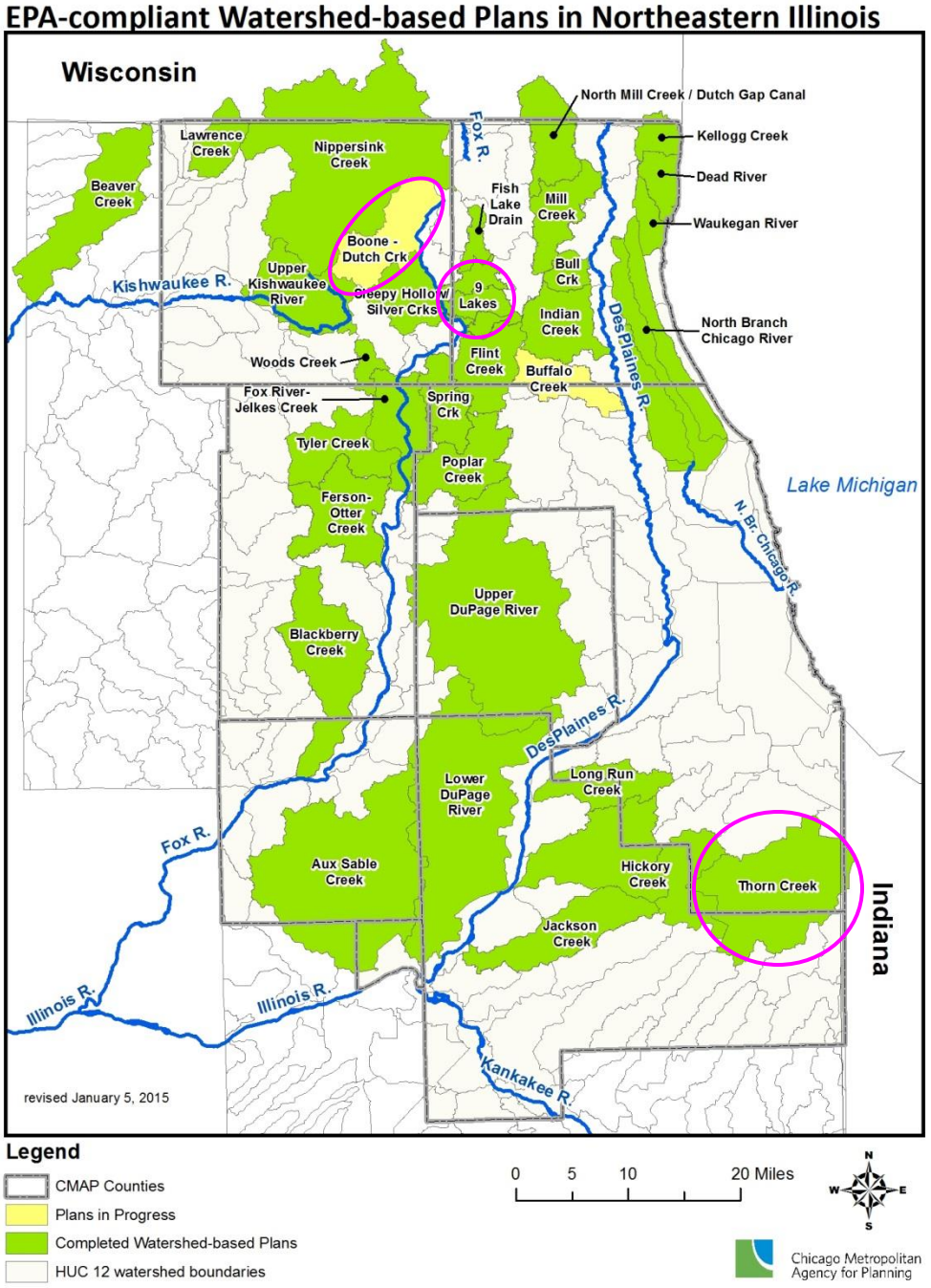


Watershed Planning in NE Illinois

Holly Hudson
Chicago Metropolitan Agency for Planning

Environment & Natural Resources Committee
January 7, 2015

CMAP



Watershed-based Plan Facilitators / Developers have included:

- CMAP (NIPC)
- Lake County Stormwater Management Commission
- The Conservation Foundation
- County Soil & Water Conservation Districts
- Local counties & municipalities
- Local watershed groups

Path to Watershed Planning

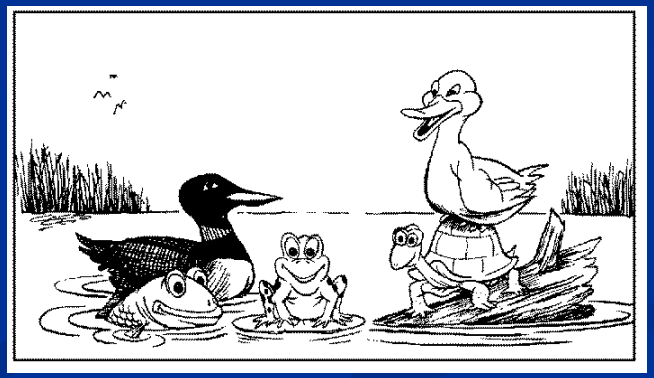
- Federal Water Pollution Control Act of 1972 (P. L. 92-500)
  - *aka* Clean Water Act
  - *"… chemical, physical, and biological integrity of the Nation's waters …"*
- U.S. EPA
- Illinois EPA - Bureau of Water
- Regional agencies
- Watershed citizens and other stakeholders

CMAP = Areawide Water Quality Planning Agency

- Areawide Water Quality Management Plan
  - *Purpose: eliminate water pollution!*
  - *Approach: watershed planning*

Why do Watershed Planning?

- To protect & improve the health of the watershed by addressing NPS pollution
- To facilitate partnerships for problem solving
- To address problems that go beyond political & geographical boundaries



- To outline activities to improve water quality
- To provide eligibility for Clean Water Act §319 grant funds, & improve odds under other grant & technical assistance programs

Watershed Planning Philosophy

- A bottom up, collaborative approach
- Create a useful plan that identifies specific problems and solutions that local communities can utilize to improve/protect surface water quality, groundwater quantity and quality, and other natural resources

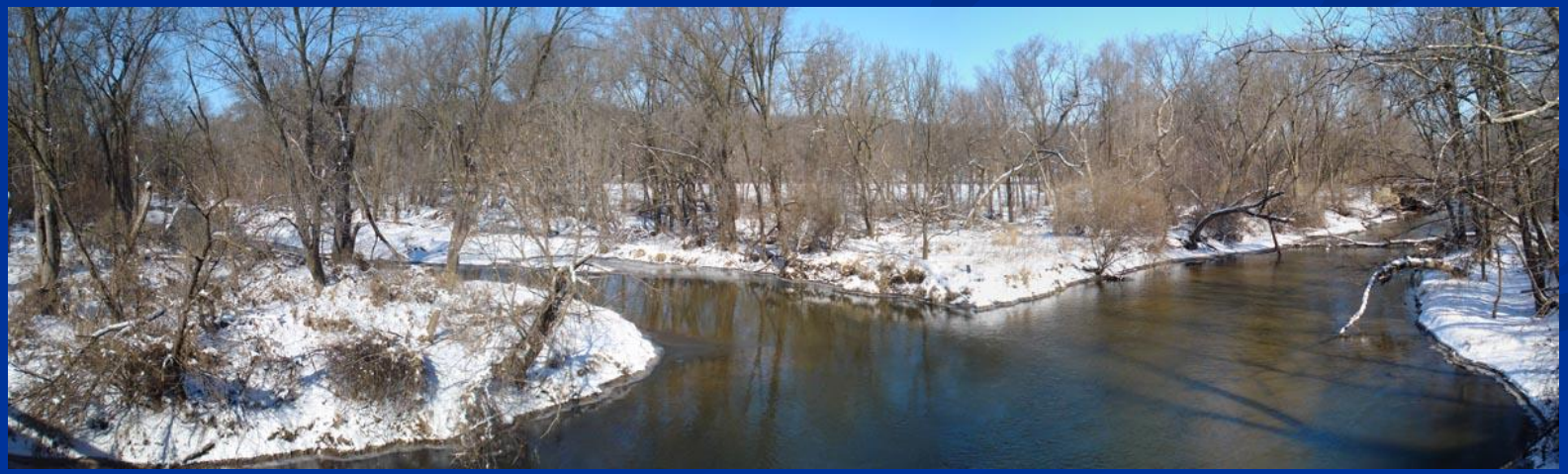


Photo courtesy of The Conservation Foundation

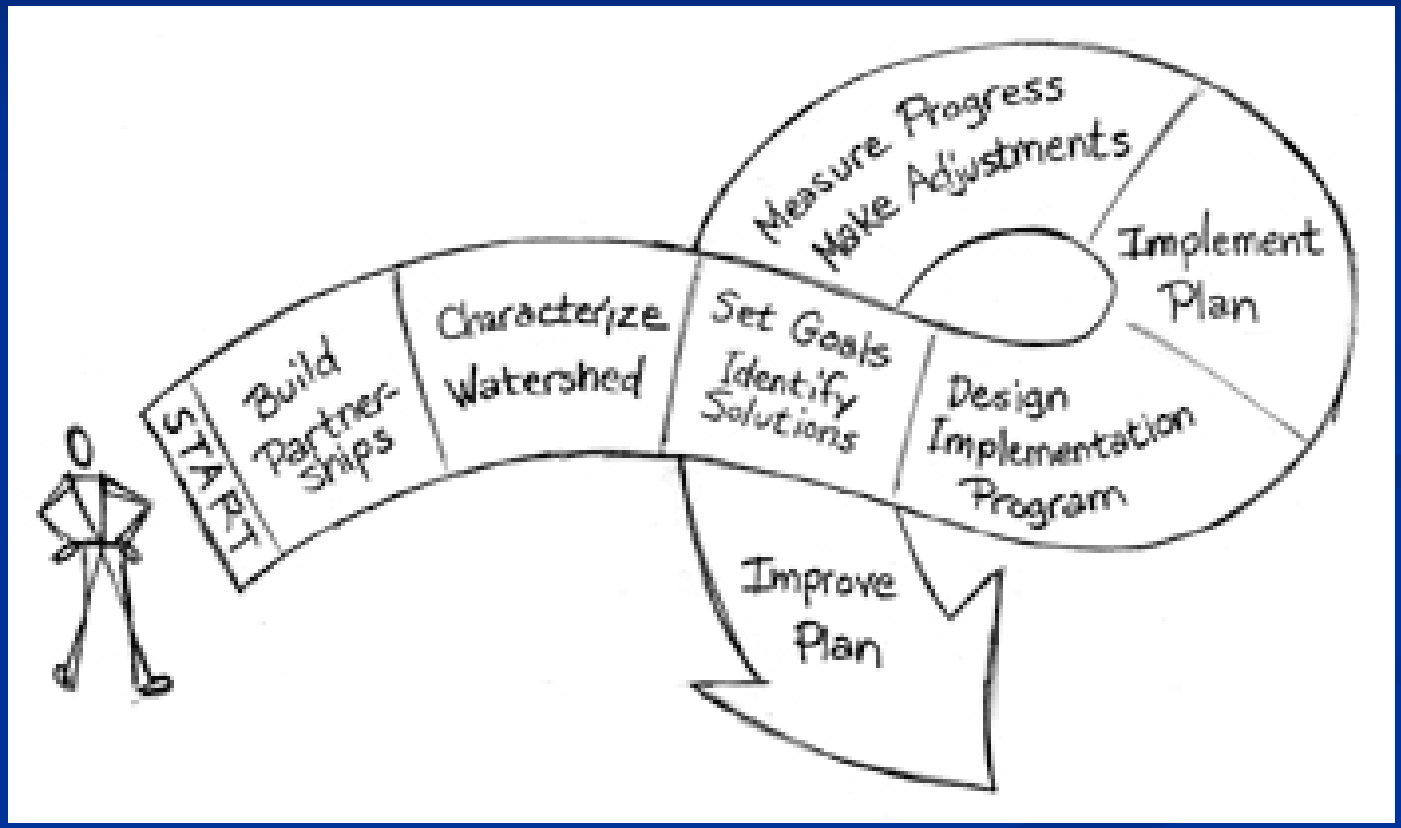
A Watershed Plan is *NOT*...

- a zoning map
- a land use map
- a means to designate land uses
- a comprehensive plan
- a required part of local comprehensive plans*
- a legally binding document

A Watershed Plan *DOES*…

- Focus on a waterway and its tributaries
- Involve stakeholders in a cooperative partnership
- Establish goals and management objectives
- Analyze watershed problems
- Provide recommendations to help with point and nonpoint source pollution issues
- Recommend voluntary methods to protect and enhance water quality
- Develop an action plan for restorative and preventative efforts
- Supports applications for grant funding and technical assistance

Watershed-based Planning Steps



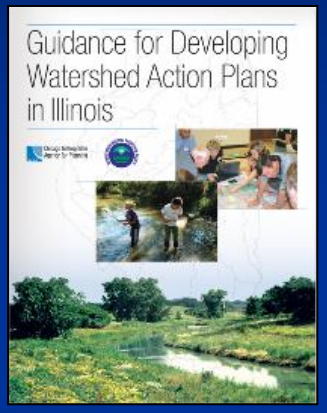
From *Handbook for Developing Watershed Plans to Restore and Protect our Waters* (USEPA, 2005)

U.S. EPA's 9 Minimum Elements of a Watershed-based Plan

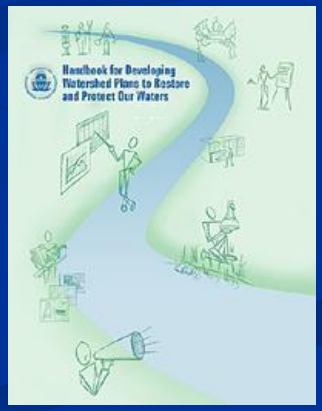
a) Identify & quantify causes of impairment & sources of pollution
b) Estimate pollutant load reductions needed to meet WQ standards
c) Identify the NPS management measures needed to achieve load reductions
d) Estimate amount of technical & financial assistance needed, and sources & authorities
e) Provide a public information and education component
f) Include a schedule for implementing the NPS management measures
g) Describe interim, measurable milestones to measure progress
h) Establish criteria to determine if load reductions being achieved
i) Provide a monitoring component to determine if progress being made toward attaining or maintaining WQ standards

Watershed-based Planning Resources

Guidance for Developing Watershed Action Plans in Illinois (CMAP & IEPA, 2007)
http://www.cmap.illinois.gov/livability/water/water-quality-management

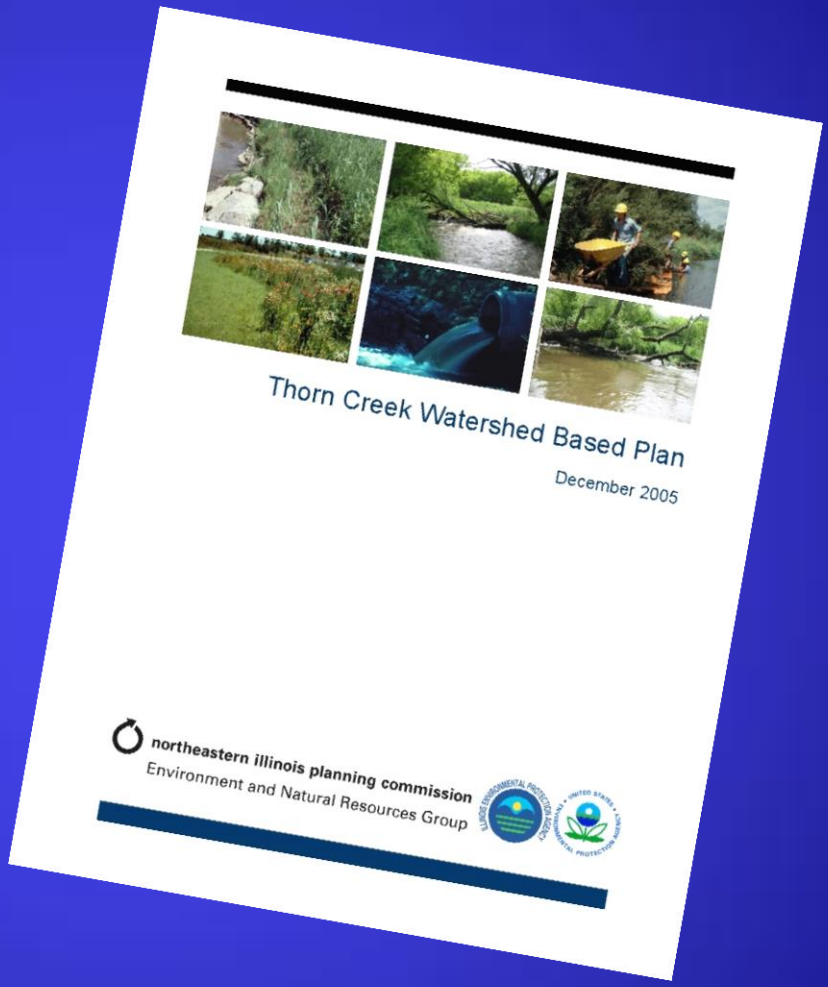


Handbook for Developing Watershed Plans to Restore and Protect our Waters (USEPA, 2005)
http://water.epa.gov/polwaste/nps/handbook_index.cfm

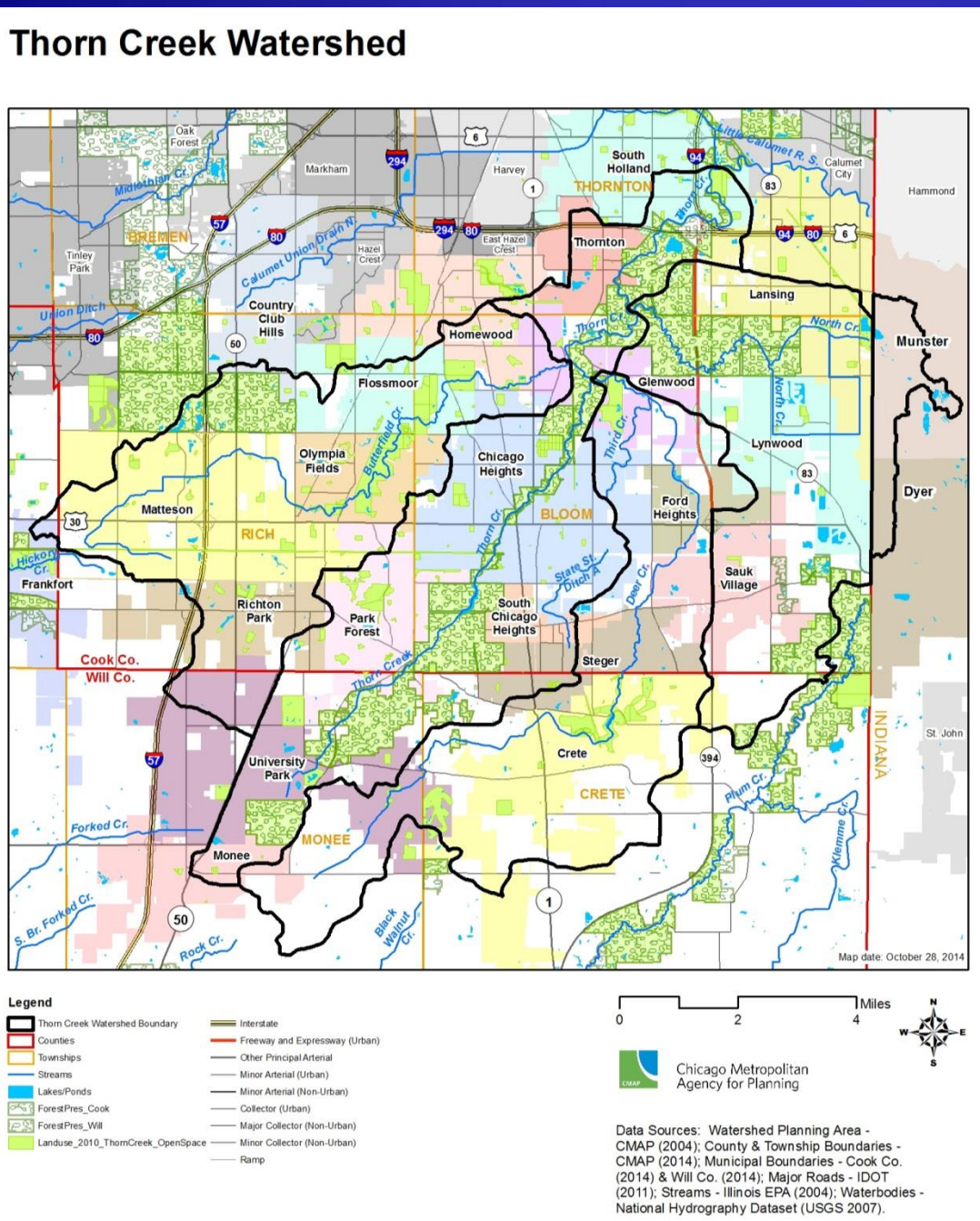


Watershed Academy Web
http://cfpub.epa.gov/watertrain/index.cfm

Thorn Creek Watershed Based Plan



http://www.cmap.illinois.gov/livability/water/water-quality-management/watershed-planning



Thorn Creek Watershed

- 108 sq. miles
  - Illinois: 105 sq. mi.
- 2 Illinois counties
  - Cook & Will
- 6 Illinois townships
  - Thornton, Rich, Bloom, Monee, Crete, Frankfort
- 19 Illinois municipalities
- >65 stream miles

Tributary Subwatersheds

- Butterfield Creek
  - 25.8 sq. mi.
- Deer Creek
  - 26.5 sq. mi.
- North Creek
  - 23.4 sq. mi

➢ Main stem Thorn Creek
  - 32.2 sq. mi.

Thorn Creek Watershed Based Plan – Chapters

1. Introduction
   - Goals and Objectives (Resource Based, Watershed Coordination)
2. Watershed Resource Inventory
3. Water Quality Assessment
4. Watershed Improvement Plan
   - Watershed Management Recommendations for Water Quality Improvement
5. Plan Implementation Evaluation

Watershed Management Recommendations (WMRs)

33 WMRs for water quality improvement

- Policy and Planning BMPs
- Structural BMPs
- Non-structural BMPs

2014 Plan Addendum

- More quantitative analysis addressing the most common structural BMPs
  - Pollutant load reductions estimate
  - Planning level implementation costs estimate

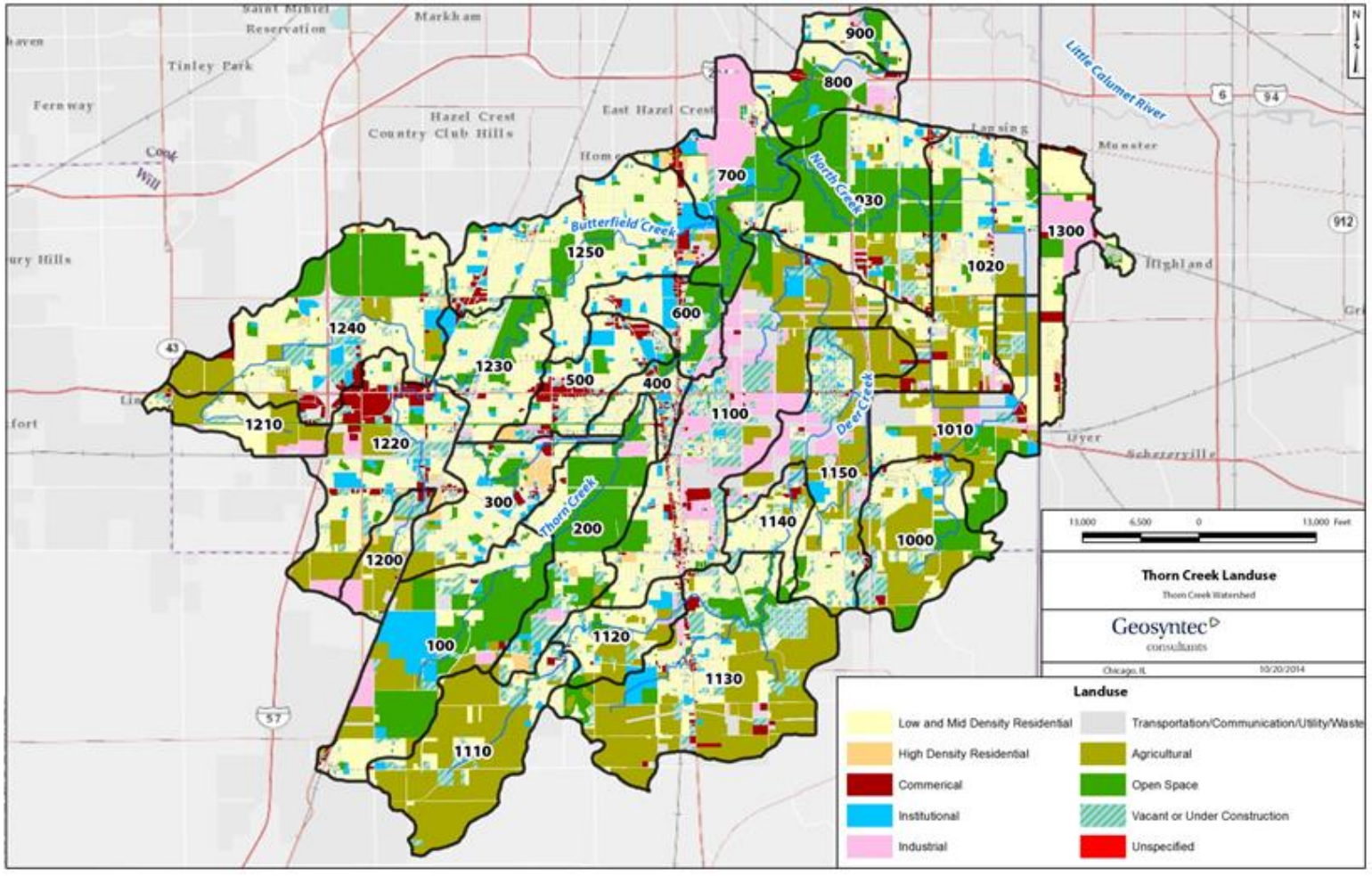
- Watershed-wide (not just main stem TC)
- Better understanding of what it will take to reach clean water goals
- Support implementation activities

Addendum Overview

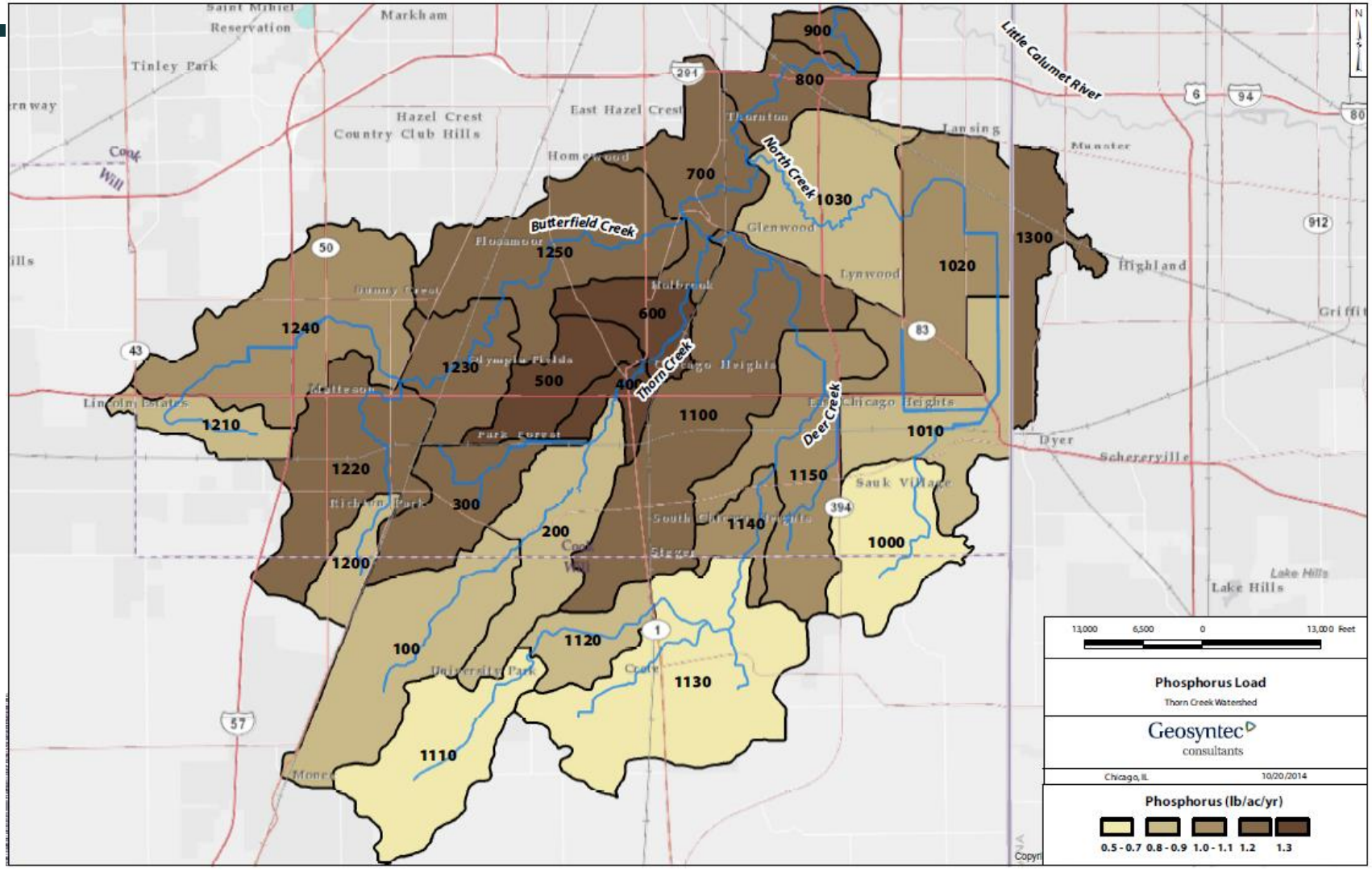
1. Update Existing Conditions Analysis
    1. Updated Landuse
    2. Pollutant Load Analysis
    3. Chloride Analysis
2. Stream Assessment
    1. Limited Desktop and Field Assessment
3. BMP Recommendations
    1. Develop a suite of BMPs and estimate water quality improvements and costs

Existing Conditions Landuse

- 2010 CMAP Landuse



Phosphorus Load Estimate (lb/ac/yr)



Chloride Analysis

- Based on Roadways
- 2011-2012 Salt Application Survey collected by DuPage River Salk Creek Workgroup
- Roadway data from GIS

Chloride Analysis

Table 2.4 Chloride Loading Scenarios

	Lane Miles[1]	@ 300 lb/lane-mile (tons/year)	@ 400 lb/lane-mile (tons/year)	@ 500 lb/lane-mile (tons/year)	@ 800 lb/lane-mile (tons/year)
County Roads	199	543	724	905	1,447
Chicago Heights	287	784	1,045	1,307	2,091
Country Club Hills	15	41	55	68	109
Crete	111	303	405	506	809
Flossmoor	83	226	301	377	603
Ford Heights	36	98	130	163	261
Frankfort	4	10	14	17	28
Glenwood	65	179	238	298	476
Homewood	62	169	225	281	450
Lansing	114	311	415	519	830
Lynwood	101	276	368	460	737
Matteson	214	585	780	974	1,559
Monee	28	77	103	129	206
Olympia Fields	94	257	343	429	686
Park Forest	153	418	557	696	1,114
Richton Park	91	248	331	414	663
Sauk Village	80	218	290	363	581
South Chicago Height	45	124	165	206	330
South Holland	50	137	182	228	364
Steger	102	278	371	464	742
Thornton	42	114	153	191	305
University Park	62	169	226	282	452
Total		**5,565**	**7,421**	**9,276**	**14,841**

Geosyntec consultants

engineers | scientists | innovators

Stream Assessment

Stream Channel and Riparian Corridor Restoration Opportunity

BMP Assessment

- Bioretention/Rain garden Opportunity

BMP Assessment

- Vegetated Swale Opportunity

BMP Assessment

- Detention Basin Retrofit Example

Before

After/During Construction

BMP Assessment

- Green Roof Example

BMP Assessment

- Manufactured Retrofit –Filterra/Bacterra

BMP Assessment

- Permeable Pavement

BMP Assessment

- BMP Distributions Identified

Table 4-1. BMP Distributions

BMP Type	Urban	Non-Urban
Bioretention/Raingarden	5%	5%
Vegetated Swales	5%	5%
Detention Basin Retrofits	5%	10%
Green Roof	2%	0%
Filterra	0.5%	0%
Bacterra	0.5%	0%
Permeable Pavement	2%	0%
Total	20%	20%

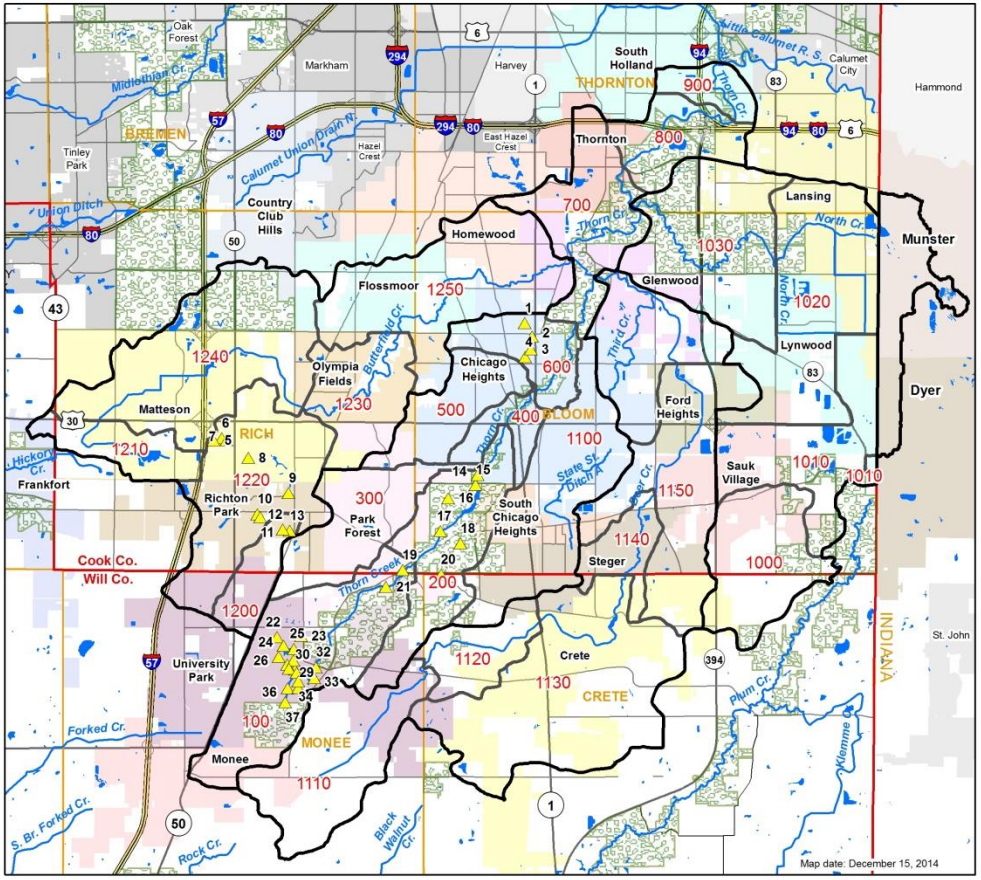
BMP Assessment

- BMP Reductions and Cost

Subwatershed	Nitrogen Reduction (lb/yr)	Phosphorus Reduction (lb/yr)	Sediment Reduction (t/yr)	Fecal Reduction (B. Col/yr)	Estimated Cost[1]
Indiana	1,579	81	104	6,017	$ 15,453,610
100	2,328	414	75	6,573	$ 3,035,165
200	1,322	238	49	5,548	$ 2,464,718
300	1,554	100	141	5,949	$ 15,217,705
400	613	37	55	1,997	$ 5,304,757
500	1,480	84	123	4,777	$ 12,188,502
600	979	60	72	2,776	$ 7,703,032
700	1,816	104	111	6,022	$ 13,651,551
800	936	58	72	2,788	$ 8,431,349
900	443	29	37	1,592	$ 4,671,059
1000	1,188	214	49	4,217	$ 2,269,009
1010	1,825	328	93	5,321	$ 2,976,128
1020	2,717	172	221	9,577	$ 27,122,304
1030	2,100	365	87	6,869	$ 3,682,712
1100	4,439	269	367	13,627	$ 36,555,356
1110	774	141	23	2,868	$ 1,508,374
1120	774	140	35	2,960	$ 1,501,375
1130	2,800	485	108	8,766	$ 4,775,135
1140	562	36	46	2,321	$ 6,978,632
1150	2,175	137	164	6,777	$ 19,515,975
1200	611	101	30	2,057	$ 961,753
1210	537	34	36	2,127	$ 6,134,025
1220	2,821	157	217	8,365	$ 23,500,795
1230	1,191	78	97	4,387	$ 13,086,410
1240	2,643	165	179	8,918	$ 26,472,581
1250	3,160	201	268	11,449	$ 32,713,909
Total	**40,208**	**4,028**	**2,591**	**133,196**	$ 265,162,010

Site-Specific BMPs

Thorn Creek Watershed Based Plan Addendum - Stakeholder-identified Site-specific BMP Locations



Legend

- Thorn Creek Watershed Boundary
- Counties
- Townships
- Lakes/Ponds
- Forest Preserve
- Streams
- BMP project locations

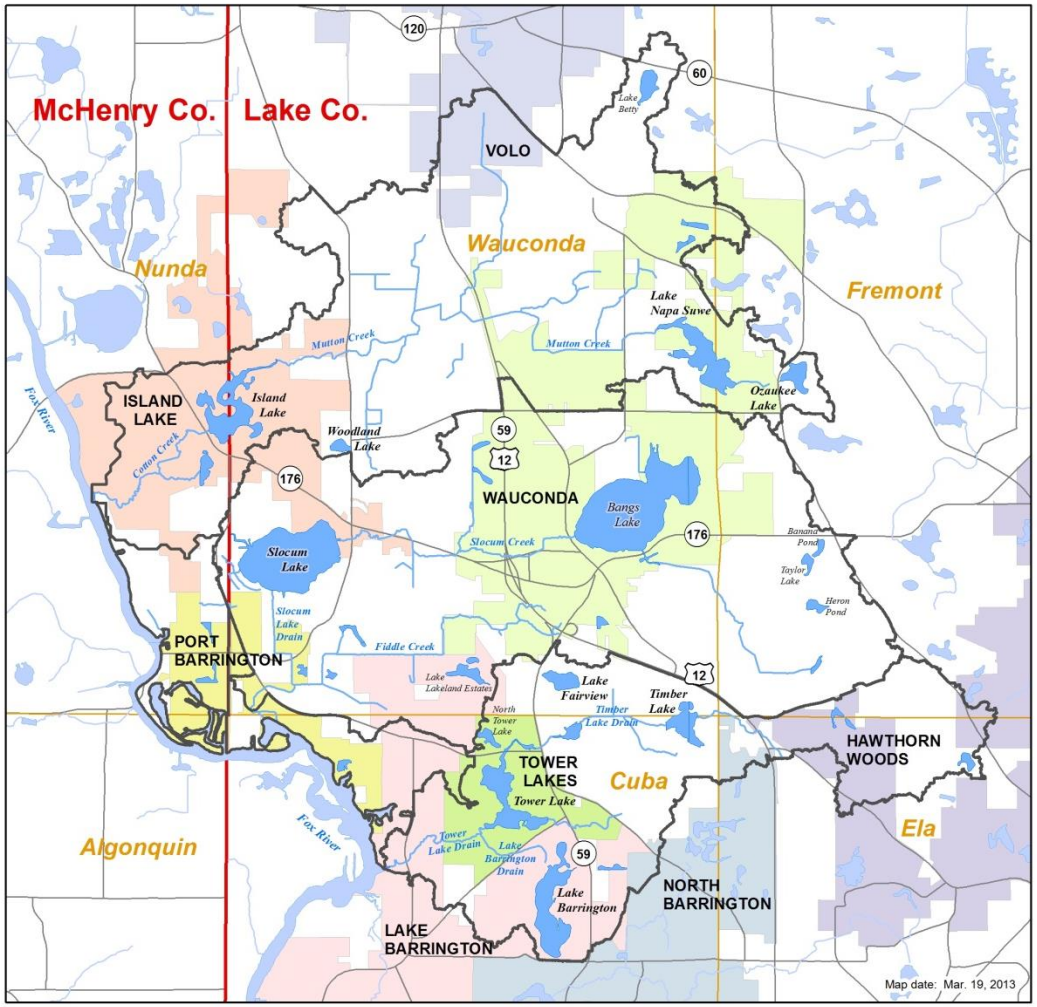
0 2 4 Miles

Chicago Metropolitan Agency for Planning

Data Sources: Watershed Planning Area - CMAP (2004); County & Township Boundaries - CMAP (2014); Municipal Boundaries - Cook Co. (2014) & Will Co. (2014); Major Roads - IDOT (2011); Streams - Illinois EPA (2004); Waterbodies - National Hydrography Dataset (USGS 2007) & CMAP Land Use (2005).

9 Lakes Watershed-Based Plan

http://www.cmap.illinois.gov/livability/water/water-quality-management/watershed-planning



9 Lakes Watershed Planning Area

- 29.3 sq. miles
- 2 counties
- 6 townships
- 8 municipalities
- >32 stream miles
- 9 TMDL lakes

Tributary Subwatersheds

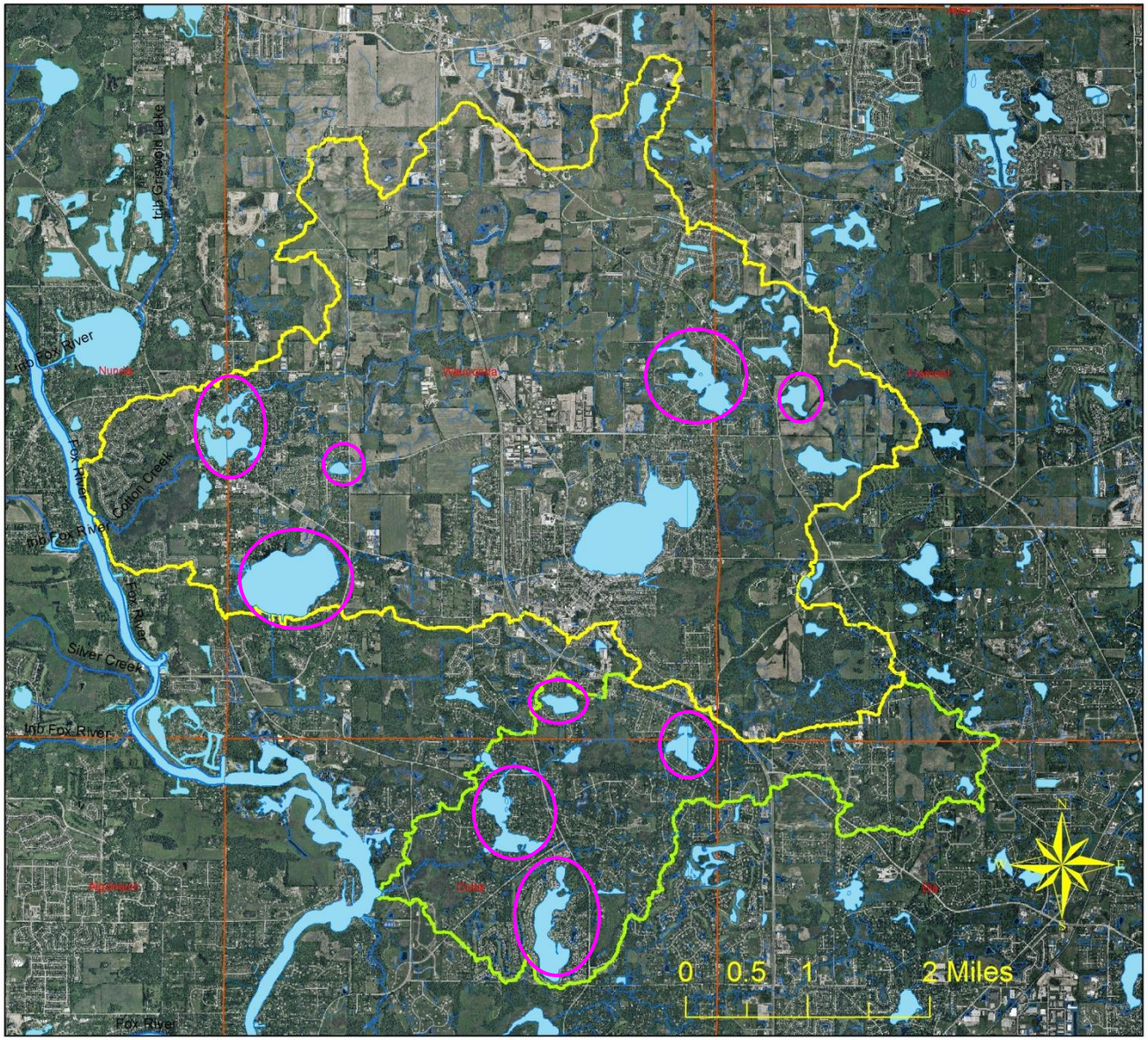
- Cotton-Mutton Creek
  - 10.2 sq. mi.
- Slocum Lake Drain - Fiddle Creek
  - 11.3 sq. mi.
- Tower Lake Drain
  - 5.9 sq. mi.
- Direct Drainage
  - 2.0 sq. mi.

The 9 TMDL Lakes

Ozaukee Lk - UTI
Lk Napa Suwe - STO
Woodland Lk - STV
Island Lk - RTZI

Slocum Lk - RTP

Timber Lk - RTZQ
Lk Fairview - STK
Tower Lk - RTZF
Lk Barrington - RTZT



Upper Fox River – Flint Creek TMDL Stage 1 Report:
http://www.epa.illinois.gov/topics/water-quality/watershed-management/tmdls/reports/index

Water Quality Impairments in 9 Lakes Planning Area

Waterbody / ID	Surface Area (ac)	Watershed Area (ac)	Impaired Designated Use	Cause of Impairment(s)	Source of Impairment(s)
Island Lake / IL_RTZI	78	5,949	Aesthetic quality	Total phosphorus, TSS	Unknown, On-site treatment systems, Yard maintenance
Lake Barrington / IL_RTZT	91	191	Aesthetic quality	Total phosphorus, TSS, Aquatic plants	Unknown
			Primary contact recreation	Fecal coliform	Unknown
Lake Fairview / IL_STK	20	30	Aesthetic quality	Total phosphorus, TSS, Aquatic plants	Unknown
Lake Napa Suwe / IL_STO	61	1,069	Aesthetic quality	Total phosphorus, TSS, Aquatic plants	Unknown
Ozaukee Lake / IL_UTI	21	66	Aesthetic quality	Total phosphorus, TSS, Aquatic plants	Unknown
Slocum Lake / IL_RTP	211	5,310	Aesthetic quality	Total phosphorus, TSS, Aquatic plants	Contaminated sediments, Agriculture, Urban runoff/ storm sewers, Runoff from F/G/P, Unknown
Timber Lake / IL_RTZQ	33	1,228	Aesthetic quality	Total phosphorus, TSS, Aquatic plants	Unknown
Tower Lake / IL_RTZF	69	3,148	Aesthetic quality	Total phosphorus, TSS, Aquatic plants	Unknown
			Prim. Con. Recr.	Fecal coliform	Unknown
Woodland Lake / IL_STV	8	52	Aquatic life	Total phosphorus, TSS, Dissolved oxygen	Pesticide application, Urban runoff/storm sewers, Runoff from F/G/P, Rural (residential areas)
			Aesthetic quality	Total phosphorus, TSS, Nonnative aquatic plants	Introduction of nonnative organisms (accidental or intentional)
Fiddle Creek / IL_DTRA-W-C1	2.04 miles		Aquatic life	Total phosphorus, Sedimentation/siltation, Chloride, Unknown	Municipal point-source discharges, Site clearance (land (re)development), Unknown

Source: IEPA – 2012 Integrated WQ Rpt

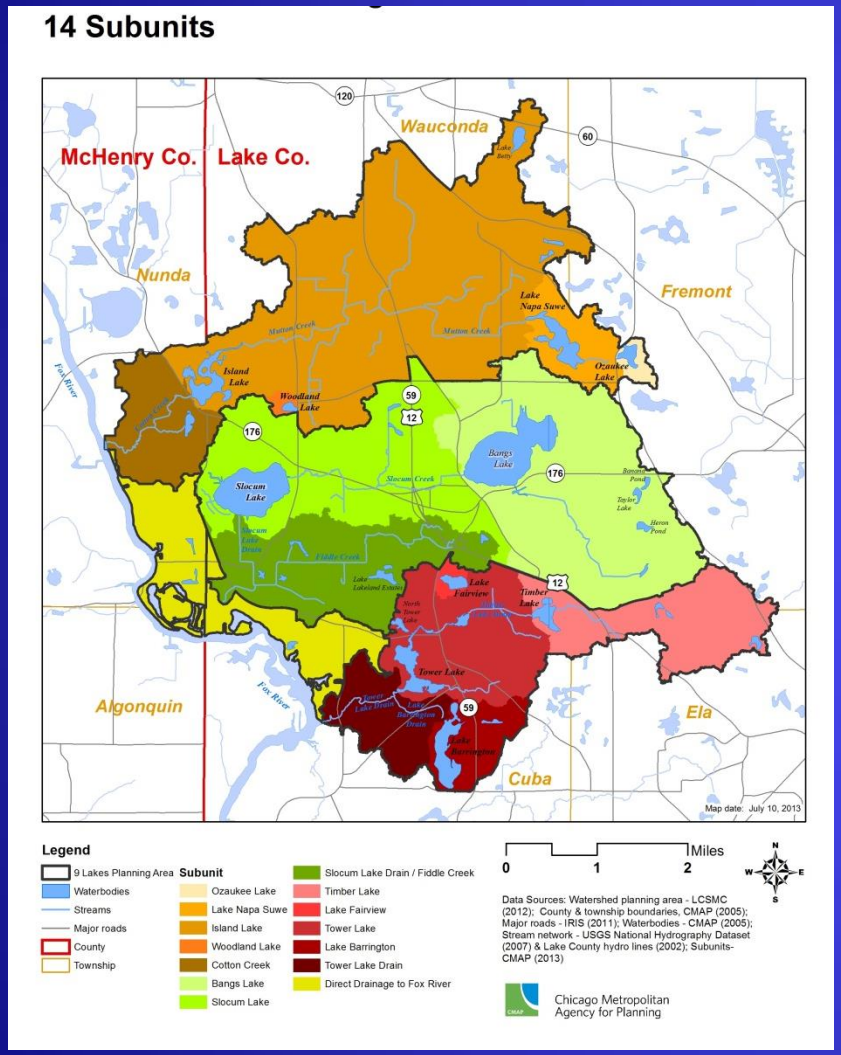
9 Lakes Watershed-Based Plan – Chapters

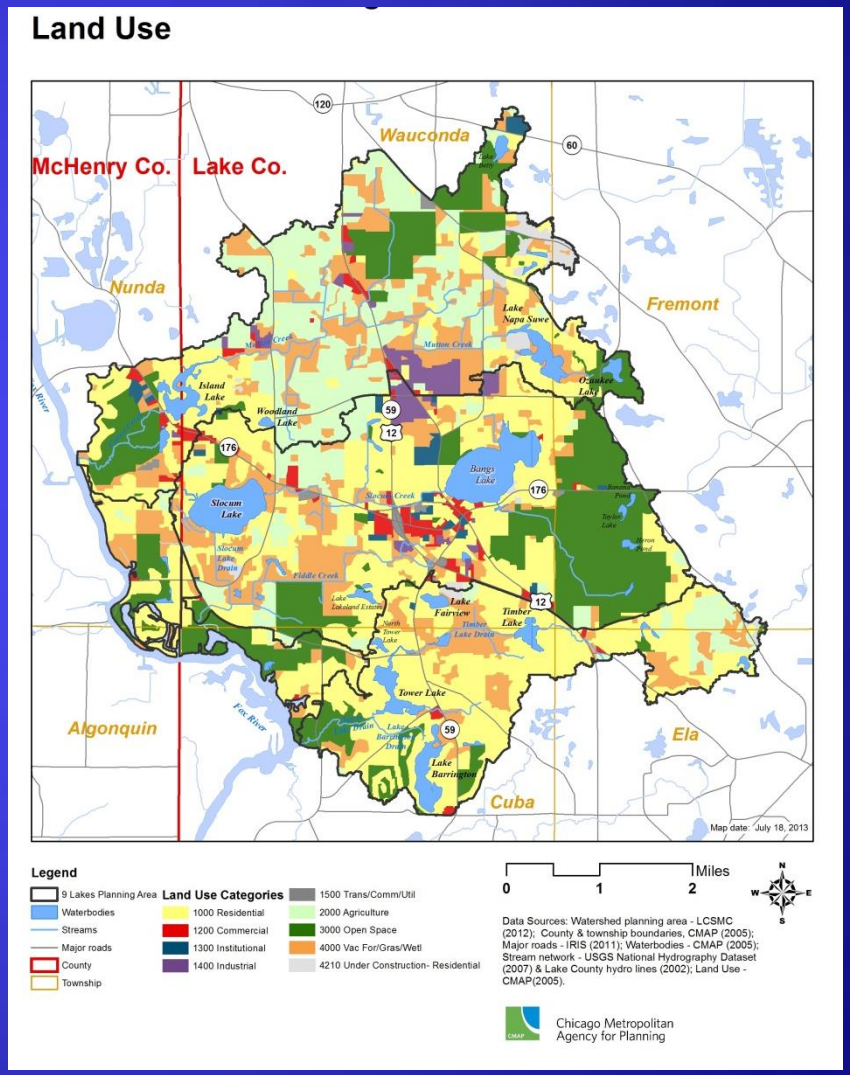
1. Introduction
   - Problems Statement, Goals, Objectives
2. Watershed Resource Inventory
3. Water Quality & BMP Pollutant Load Reductions
4. Information and Education
5. Monitoring Success

Watershed Resource Inventory

Physical & Natural Features	Land Use & Population Characteris-tics	Waterbody & Watershed Conditions	Pollutant Sources	Waterbody Monitoring Data
• Watershed boundaries • Hydrology • Topography • Soils • Geology • Climate • Habitat • Fish & Wildlife • Ecosystems	• Land use • Land cover • Land mngmnt practices • Demographics	• WQ standards • Impairment status *Surface water & Groundwater*	• Point sources • Nonpoint sources *NPS pollutant load modeling*	• WQ • Flow • Biological • Geomorpho-logical

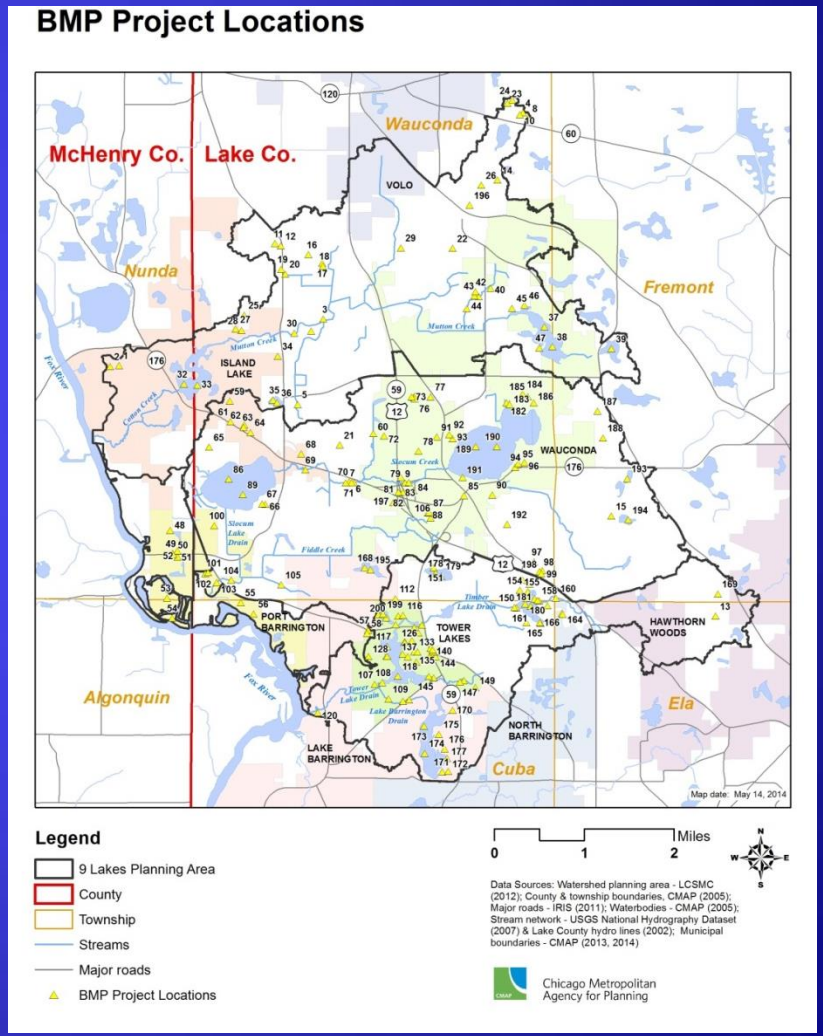
Pollutant Load Modeling





Best Management Practices

- Watershed-wide
  - roadside bioswales, streambank stabilization, green roofs, ag field borders
- Site-specific
  - bioswales, shoreline stabilization, grassed waterways, ag & urban filter strips, wetland restoration, det. basin retrofits, parking lot retrofits (incl. porous pavements), bioinfiltration facilities (incl. rain gardens)



BMP Estimated Pollutant Load Reductions

Pollutant load reductions from BMPs compared to incoming/baseline loads for entire 9 Lakes Planning Area

	N (lbs/yr)	P (lbs/yr)	Bacteria (Bcol/yr)	TSS (lbs/yr)	Sediment (tons/yr)	Cl (lbs/yr)
Baseline loads	74,865	7,685	43,353	7,063,987	---	2,235,810
BMP load reductions	9,931	2,342	7,314	1,083,683	794	6,731
Percent reductions from all BMPs	**13.3**	**30.5**	**16.9**	**15.3**	**---**	**0.3**

BMP Estimated Pollutant Load Reductions and Costs

Summary of pollutant load reductions associated with watershed-wide BMPs

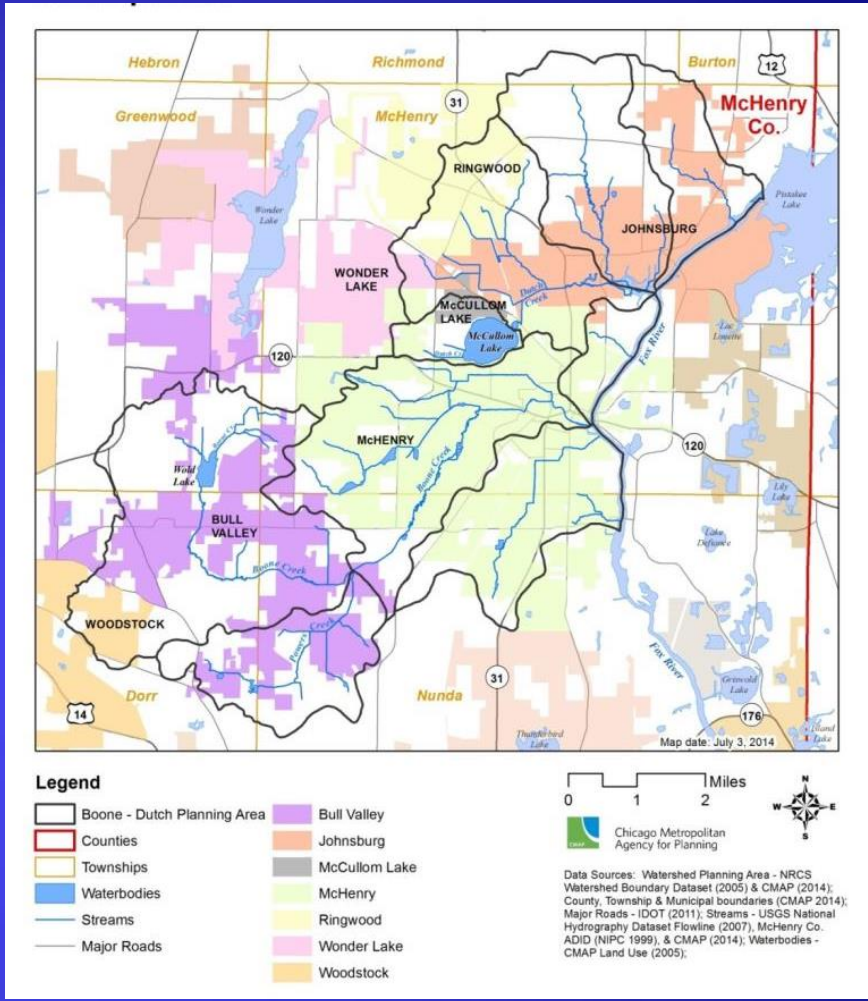
BMP Name	Amount	Unit	Cost ($)	Sediment (tons/yr)	TSS (lbs/yr)	Phosphorus (lbs/yr)	Nitrogen (lbs/yr)
Ag field borders	46.1	acre	7,842	---	35,849	23	245
Bioswales	117,859	feet	4,950,078	---	275,787	824	4125
Green roofs	45.4	acre	29,664,360	---	14,236	6	339
Streambank stabilization	222,760	feet	35,641,600	702	---	728	1372
Totals			**70,263,880**	**702**	**325,872**	**1,581**	**6,081**

Next? … *Action!*

- Local champions
  - Tower Lakes Drain Partnership
    (Timber Lk, Tower Lks, Lk Fairview, Lk Barrington)
  - Island Lake Management Cmte
  - Bangs Lake Advisory Cmte
- Grants & tech. assistance
  - Lake Co. SMC: Watshd Mngmnt Board grants
  - IEPA: 319, PLWIP grants
  - CMAP: LTAP
- Advisors
  - CMAP, Lake Co. SMC, LCHD - LMU

Boone-Dutch Creek Watershed Planning

- 45.3 sq. miles
  - Boone Crk: 23.5 sq. mi.
  - Dutch Crk: 14.2 sq. mi.
  - Direct drain: 7.6 sq. mi
- 2 yr plng process: 2014-2015
- Boone Creek WRAS (NIPC & BCWA 2003)



Chicago Metropolitan Agency for Planning

Illinois Environmental Protection Agency

Fox River Ecosystem Partnership

Environmental Defenders of McHenry County

Boone Creek Watershed Alliance

Project Webpage

- http://foxriverecosystem.org/Boone-Dutch.htm

Challenge: Engaging local goverments, other key stakeholders

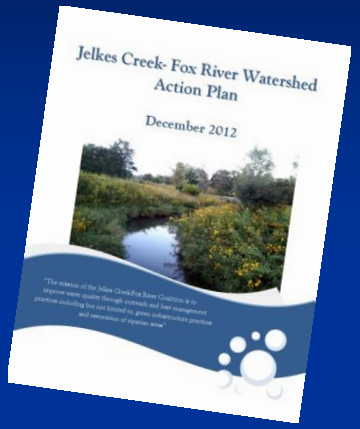
Watershed-Based Planning & Implementation with Section 319 Grants

- Federal grant program authorized by §319(h) of the Clean Water Act
- Administered by U.S. EPA and Illinois EPA

  - http://www.epa.state.il.us/water/financial-assistance/

Types of Eligible 319 Projects

High Priority:

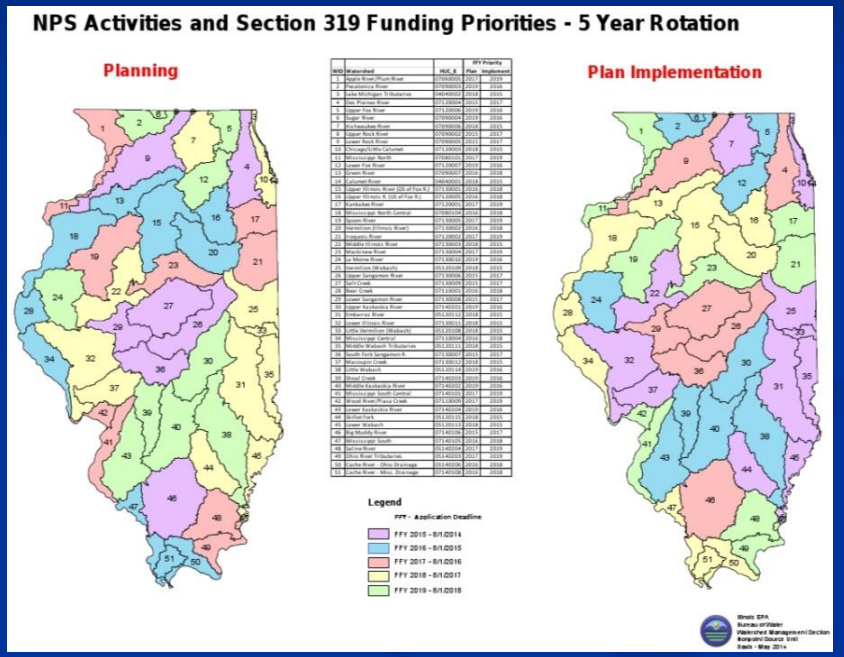


- Development of a watershed-based plan to address NPS pollution

- Implementation of activities identified in an IEPA-approved watershed-based plan (WBP) or Total Maximum Daily Load (TMDL) implementation plan
  - BMP installation
  - NPS WQ modeling
  - Environmental monitoring
  - Social indicator monitoring
  - Outreach activities
  - Updating a watershed-based plan

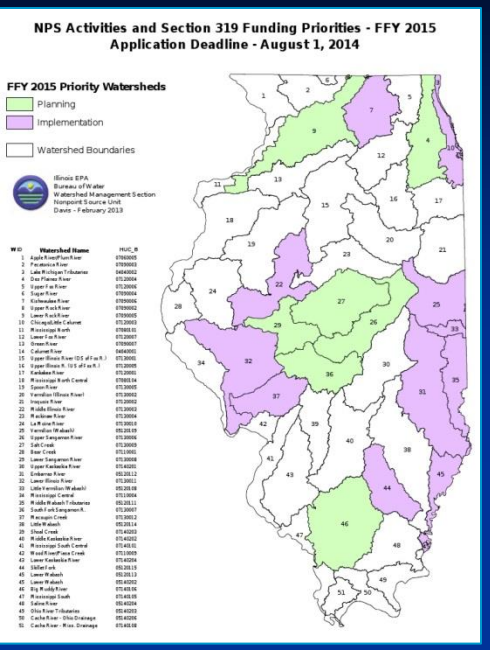
Illinois EPA Priority Watersheds

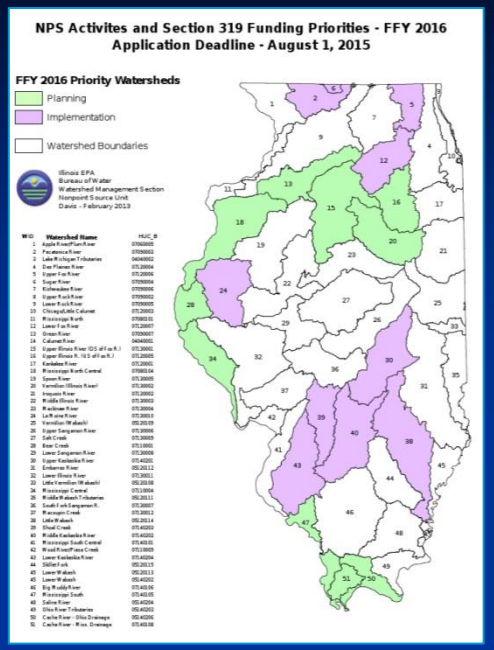
- 51 basins in Illinois
- Each yr, 8-11 basins priority for planning
- 2 yrs later, same basins priority for implementation

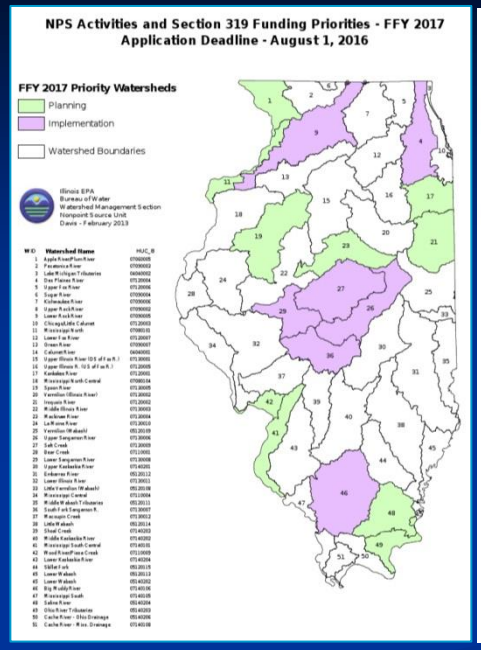


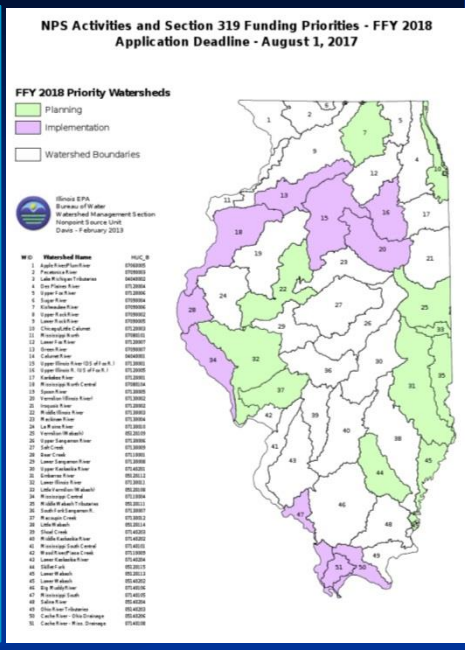
http://epa.state.il.us/water/watershed/publications/nps-pollution/priority-watersheds.pdf

Illinois EPA Priority Watersheds









FFY 2015
Plng: Des Plaines

Implem: Kishwaukee, Chicago/Little Calumet, Calumet

FFY 2016
Plng: Upper Illinois

Implem: Upper & Lower Fox

FFY 2017
Plng: Kankakee

Implem: Des Plaines

FFY 2018
Plng: Kishwaukee, Lk Michigan Tribs, Calumet

Implem: Upper Illinois

http://epa.state.il.us/water/watershed/publications/nps-pollution/priority-watersheds.pdf

State Revolving Loan Program

- Illinois Clean Water Initiative
  - Stormwater quality / treatment BMP projects now eligible for low-interest loans (in addition to drinking water and wastewater projects)
  - Funding doubled to $2 billion
  - Local units of government
  - Rolling application process
    - http://www.epa.state.il.us/water/financial-assistance/clean-water-initiative/index.html

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